Tools and Environment

Software 1 and Software 2 – Python Labs for Math and Physics

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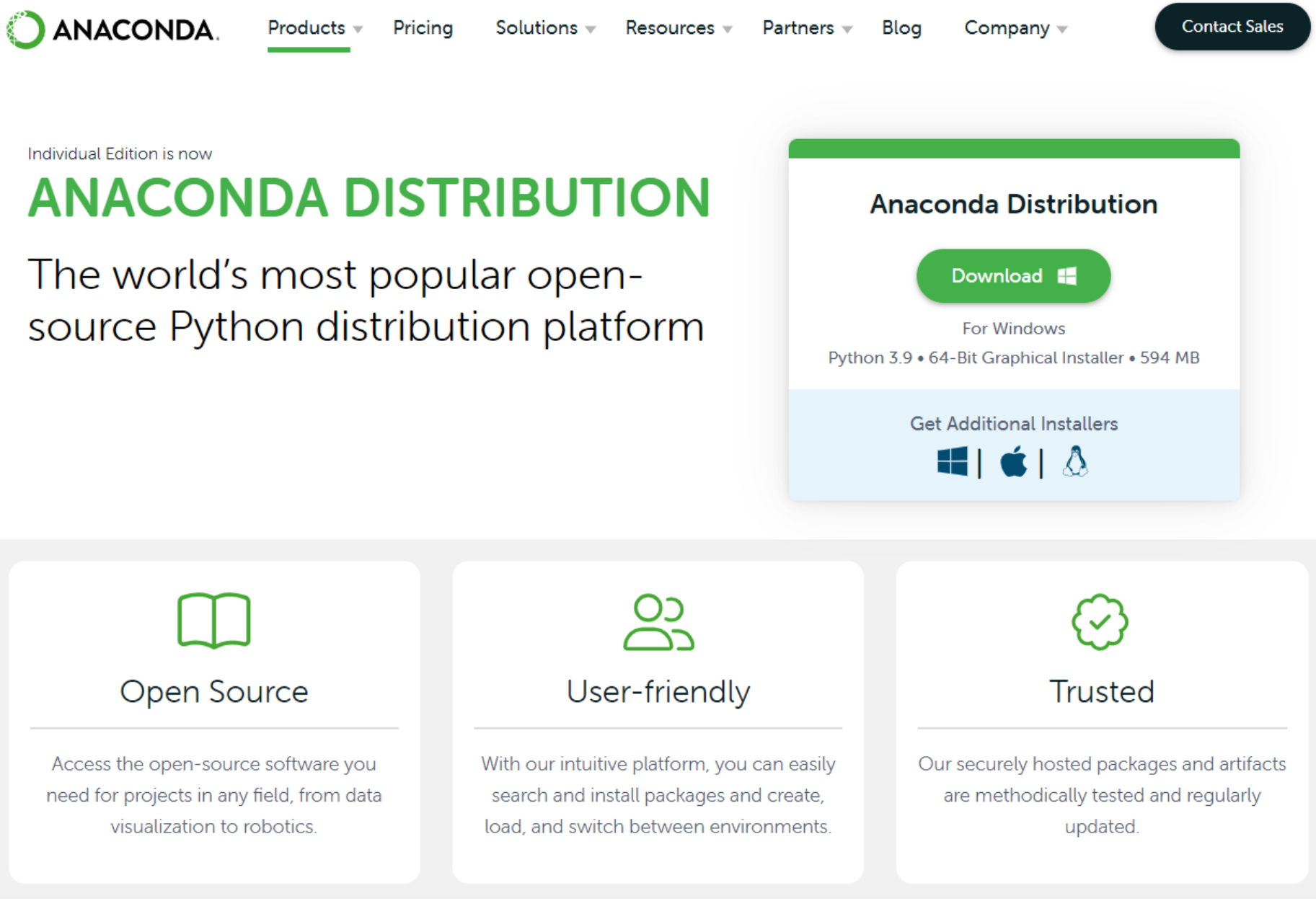
The Environment

Python, Anaconda, JupyterLab and Notebooks



https://www.anaconda.com/products/individual

Features

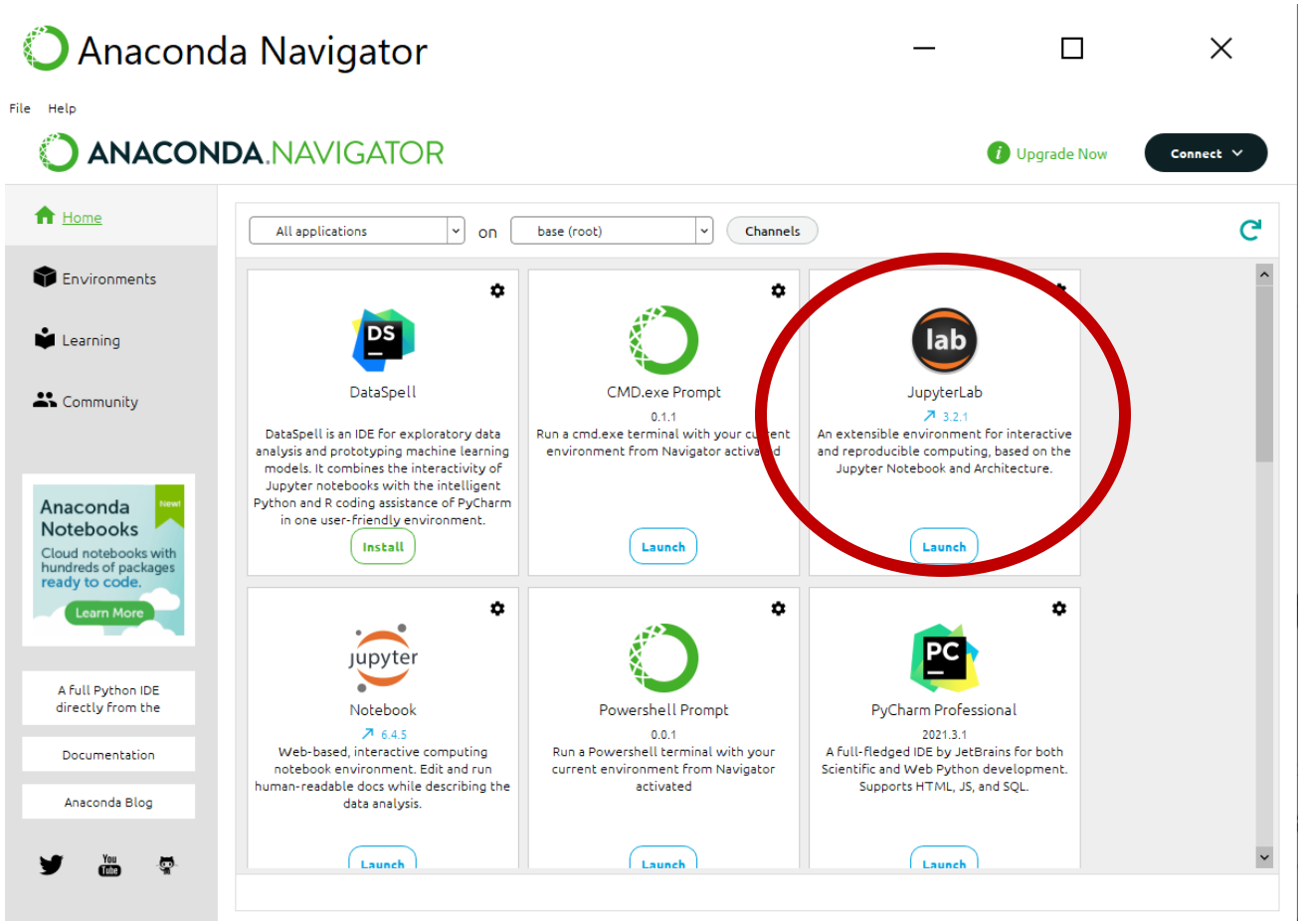
Anaconda Repository

Our repository features over 8,000 open-source data science and machine learning packages, Anaconda-built and compiled for all major operating systems and architectures.

https://www.anaconda.com/products/individual

Anaconda Navigator

1. Install Anaconda Distribution
2. Open Anaconda Navigator
3. Launch JupyterLab

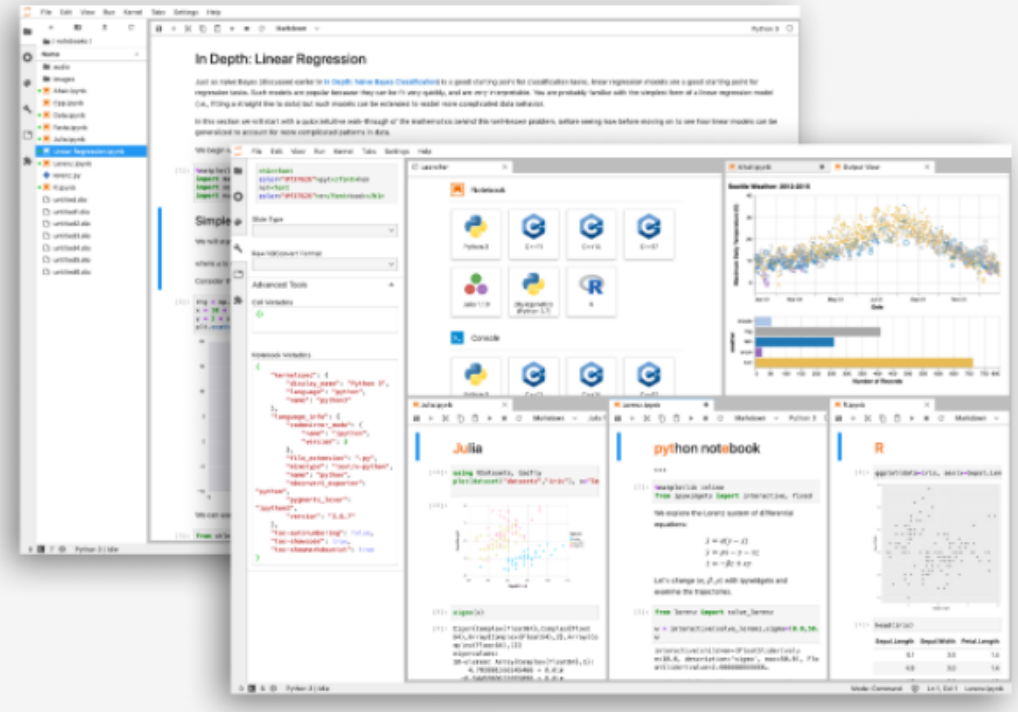


[Anaconda Distribution > Download]

Jupyter Notebook

with Anaconda Distribution on own computer

JupyterLab



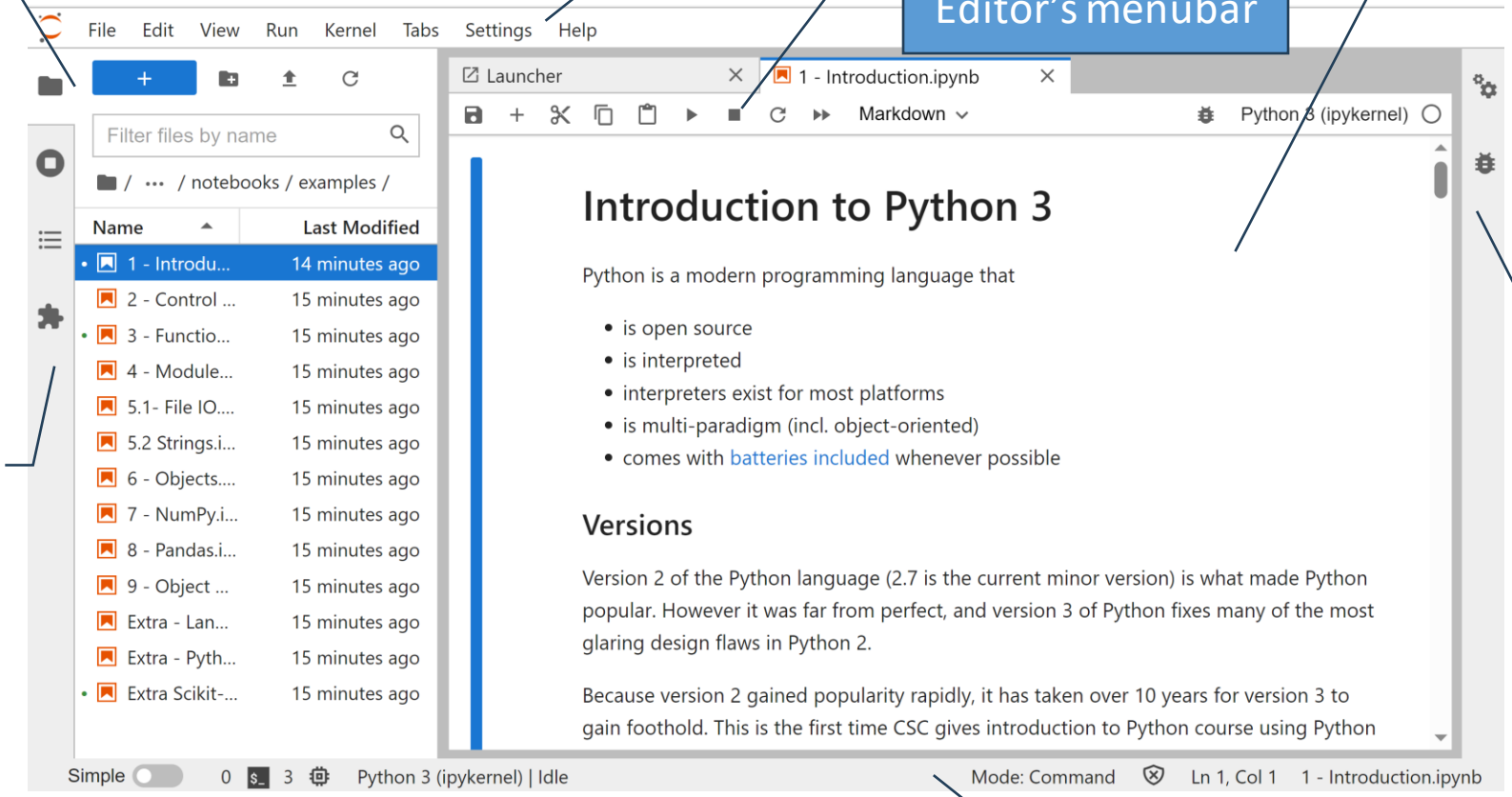
JupyterLab: Jupyter's Next-Generation Notebook Interface

JupyterLab is a web-based interactive development environment for Jupyter notebooks, code, and data. JupyterLab is flexible: configure and arrange the user interface to support a wide range of workflows in data science, scientific computing, and machine learning. JupyterLab is extensible and modular: write plugins that add new components and integrate with existing ones.

Try it in your browser | Install JupyterLab

https://jupyter.org/

JupyterLab Interface



Main menubar

Editor/Main area

Files and folders

Editor's menubar

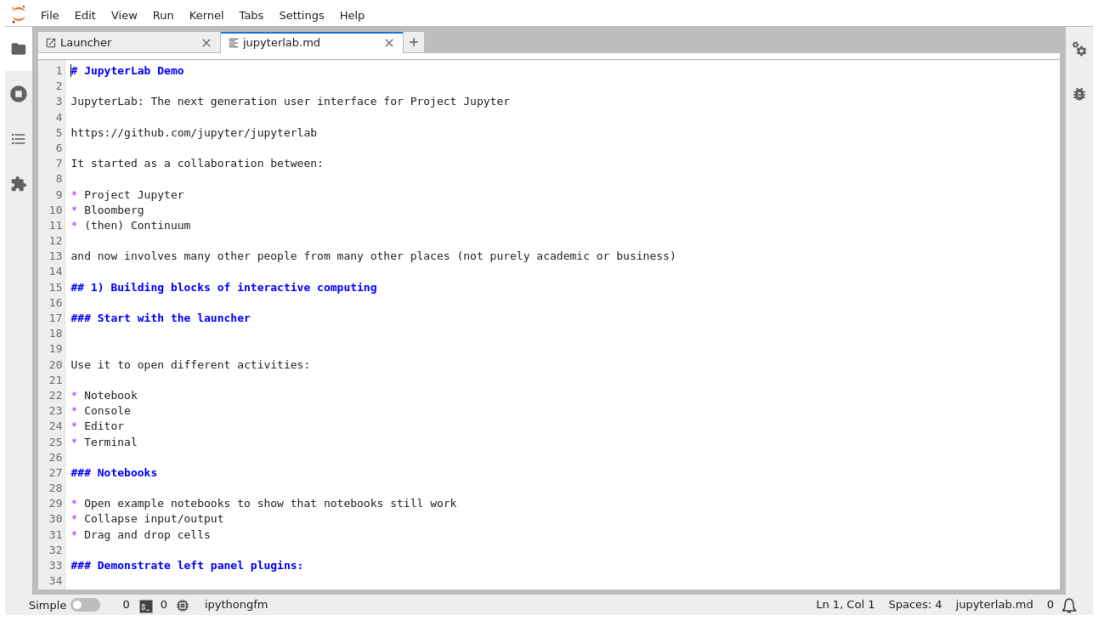
Right sidebar

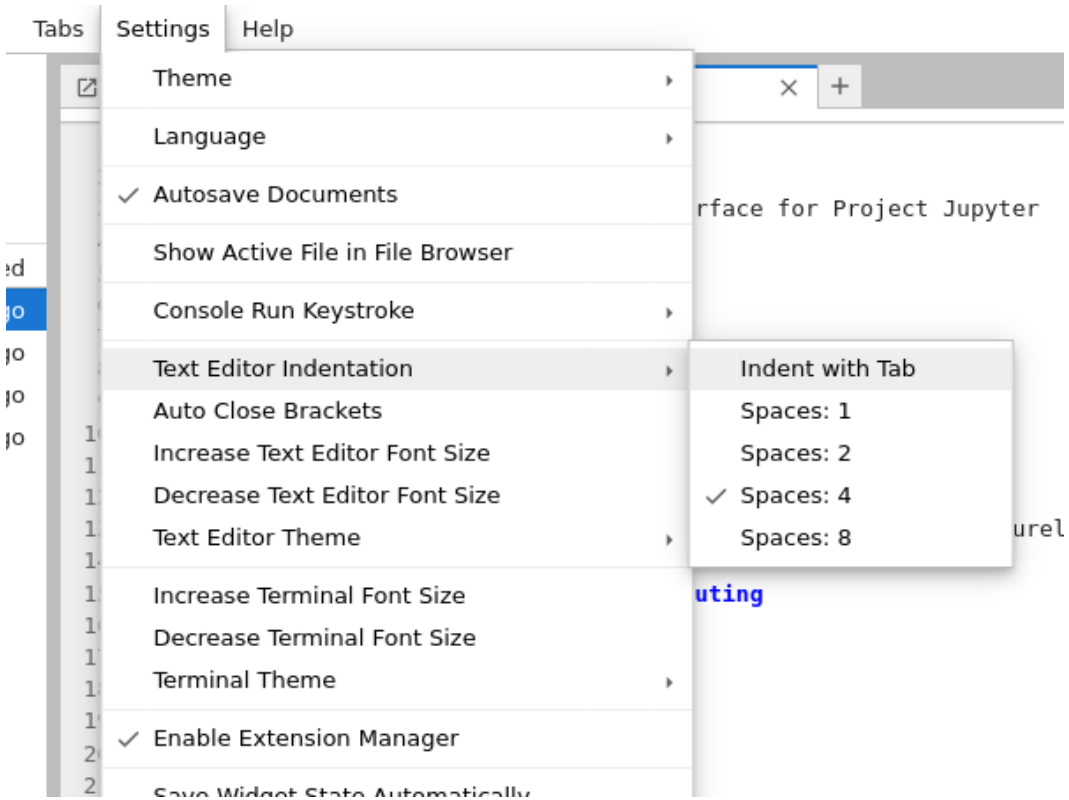
Tabs

Status bar

[The JupyterLab Interface — JupyterLab 3.4.5 documentation]

Editor



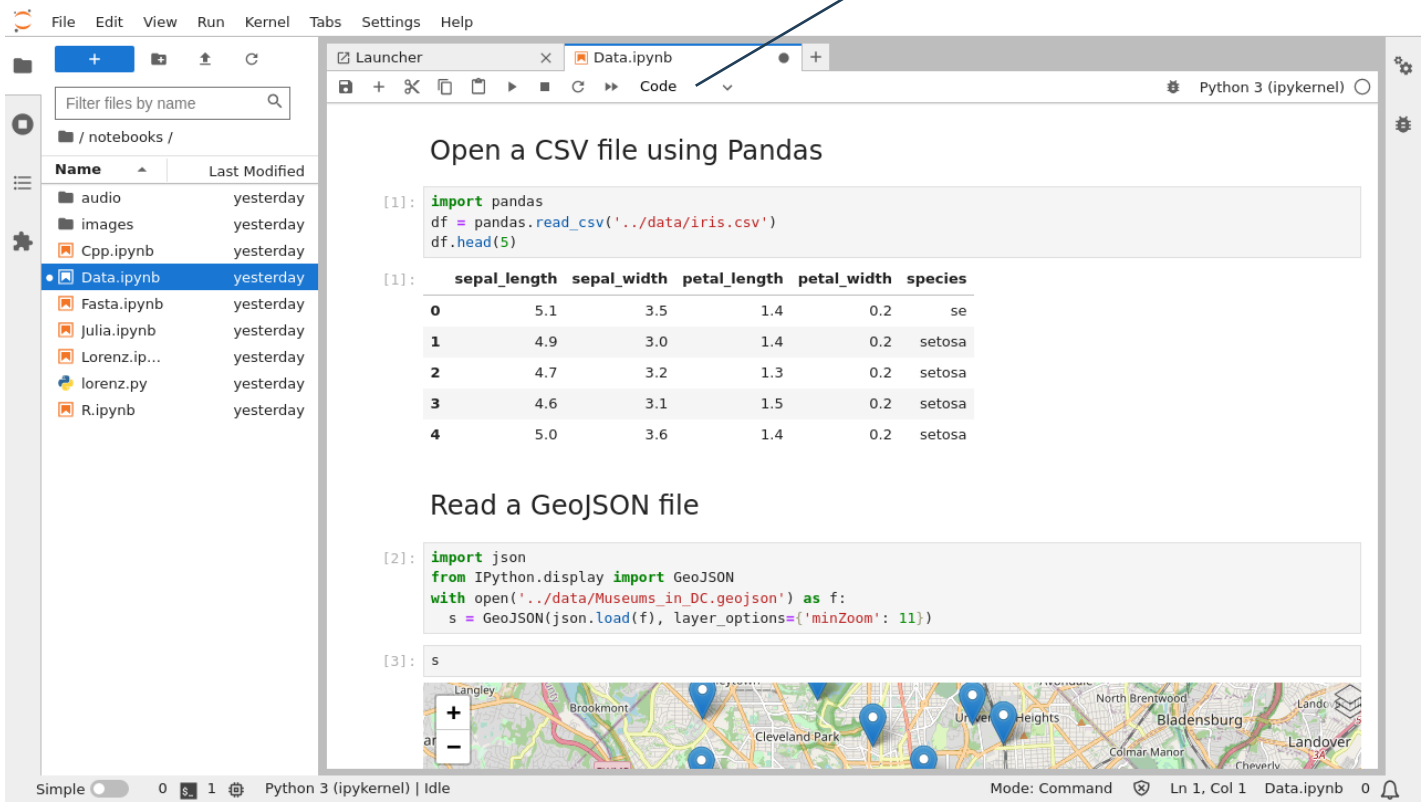


The text editor includes syntax highlighting, configurable indentation (tabs or spaces) and basic theming. These settings can be found in the Settings menu.

[Text Editor — JupyterLab 4.0.5 documentation]

Notebooks

You work with cells.
The cell can be Code or Markdown.



Jupyter notebooks are documents stored into .ipynb files. You can convert these documents into several other formats (File > Save and Export Notebook as …)

Jupyter notebooks are documents that combine

- live runnable code with
- narrative text (Markdown), equations (LaTeX),
- images,
- interactive visualizations and
- other rich output

[Notebooks — JupyterLab 4.0.5 documentation]

Markdown

Markdown is a simple way to format text that looks great on any device. It does just the essentials, using keyboard symbols you already know.

TRY OUR 10 MINUTE MARKDOWN TUTORIAL

Type	Or	... to Get
`*Italic*`	`_Italic_`	*Italic*
`**Bold**`	`__Bold__`	**Bold**
`# Heading 1`	`Heading 1` `=========`	Heading 1
`## Heading 2`	`Heading 2` `---------`	Heading 2

`[Link](http://a.com)`	`[Link][1]`
	⋮
	`[1]: http://b.org`
		Link

`![Image](http://url/a.png)`	`![Image][1]`
	⋮
	`[1]: http://url/b.jpg`
		

Help > Markdown reference

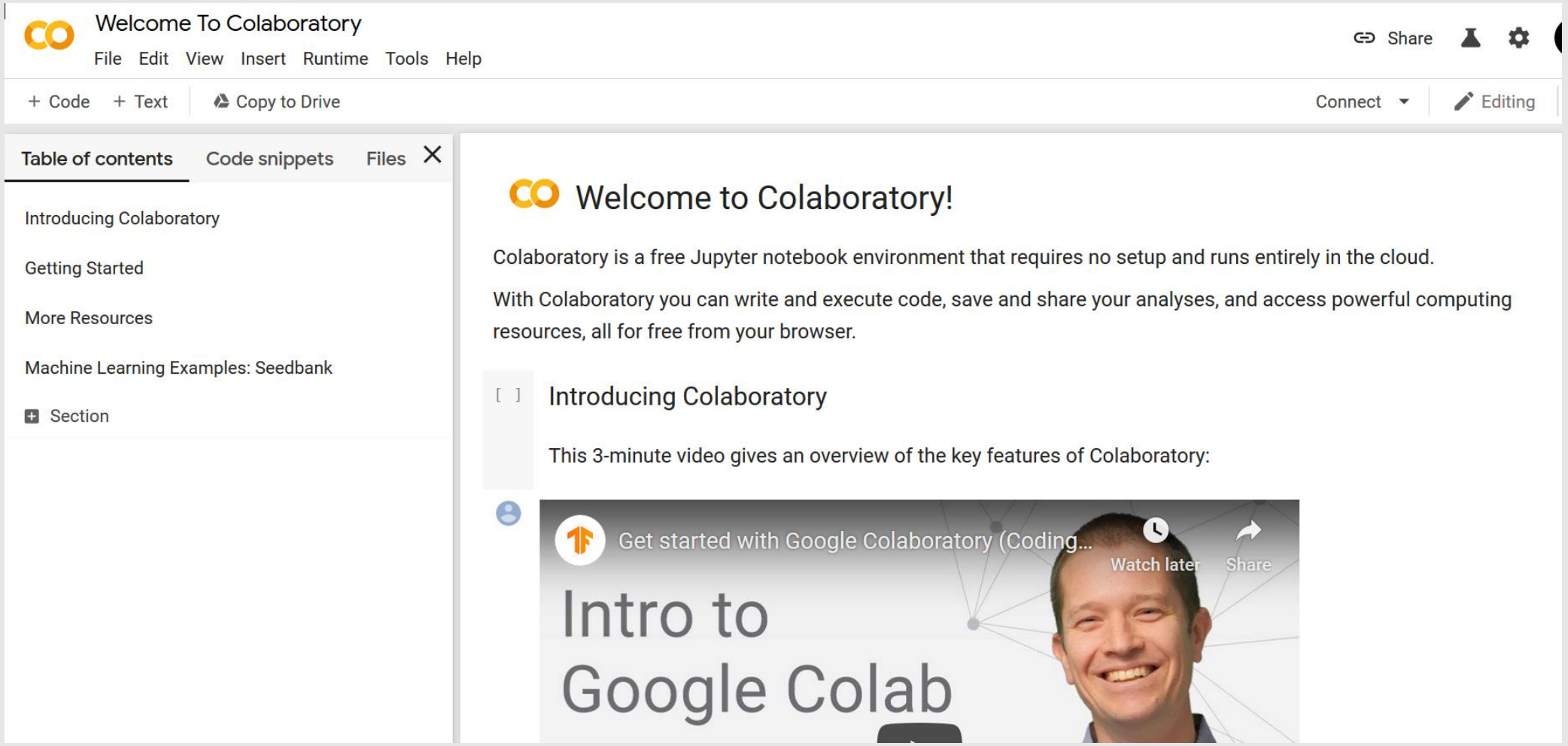
Extras

Jupyter Notebook Cloud Services

- **Google Colab**
- CSC Notebooks (Finland, EU)

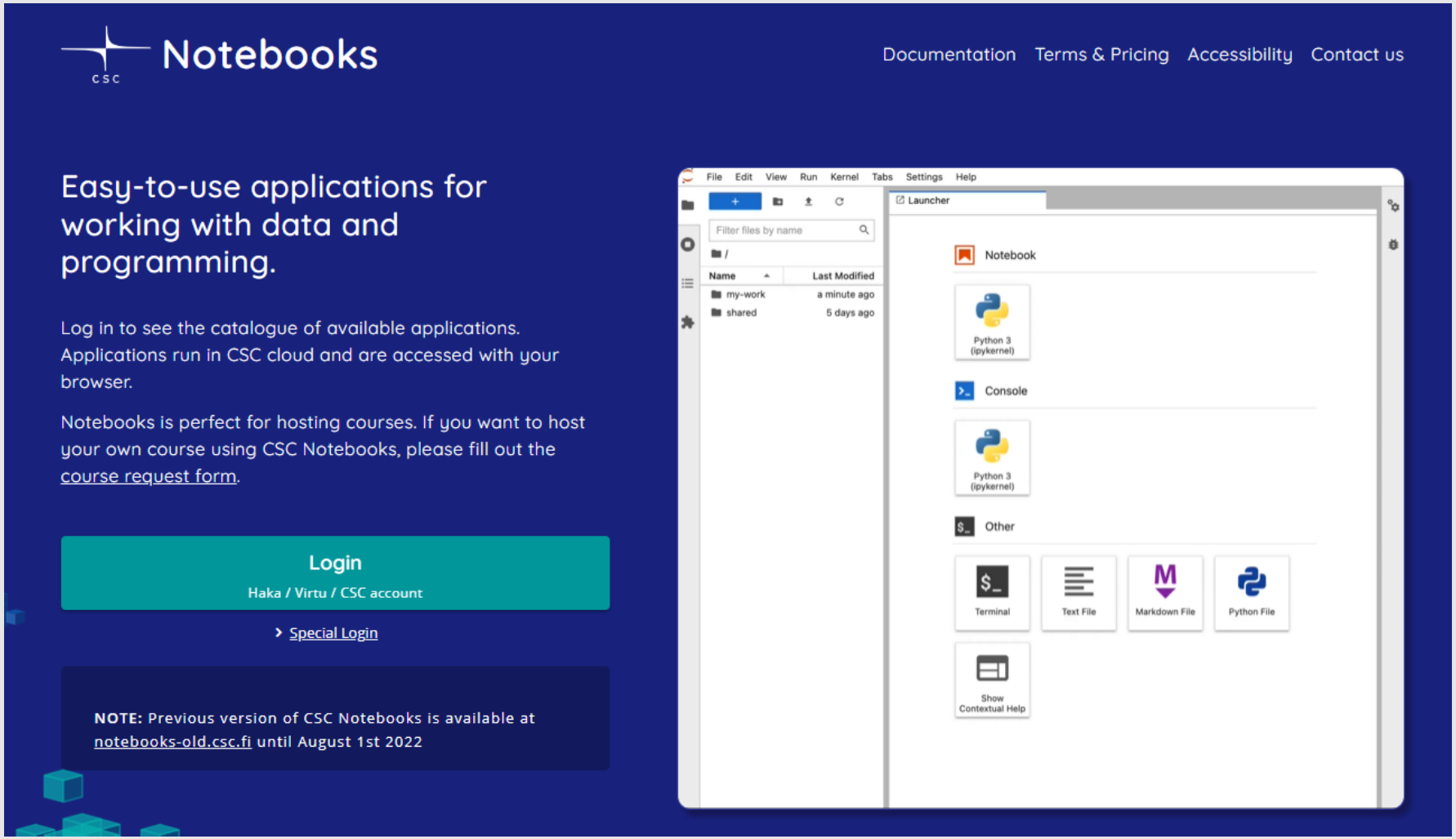
- Anaconda Nucleus
- Kaggle: Your Machine Learning and Data Science Community
- GitHub Codespaces (Microsoft)
- JupyterHub (Amazon EMR)

Google Colab and Notebooks



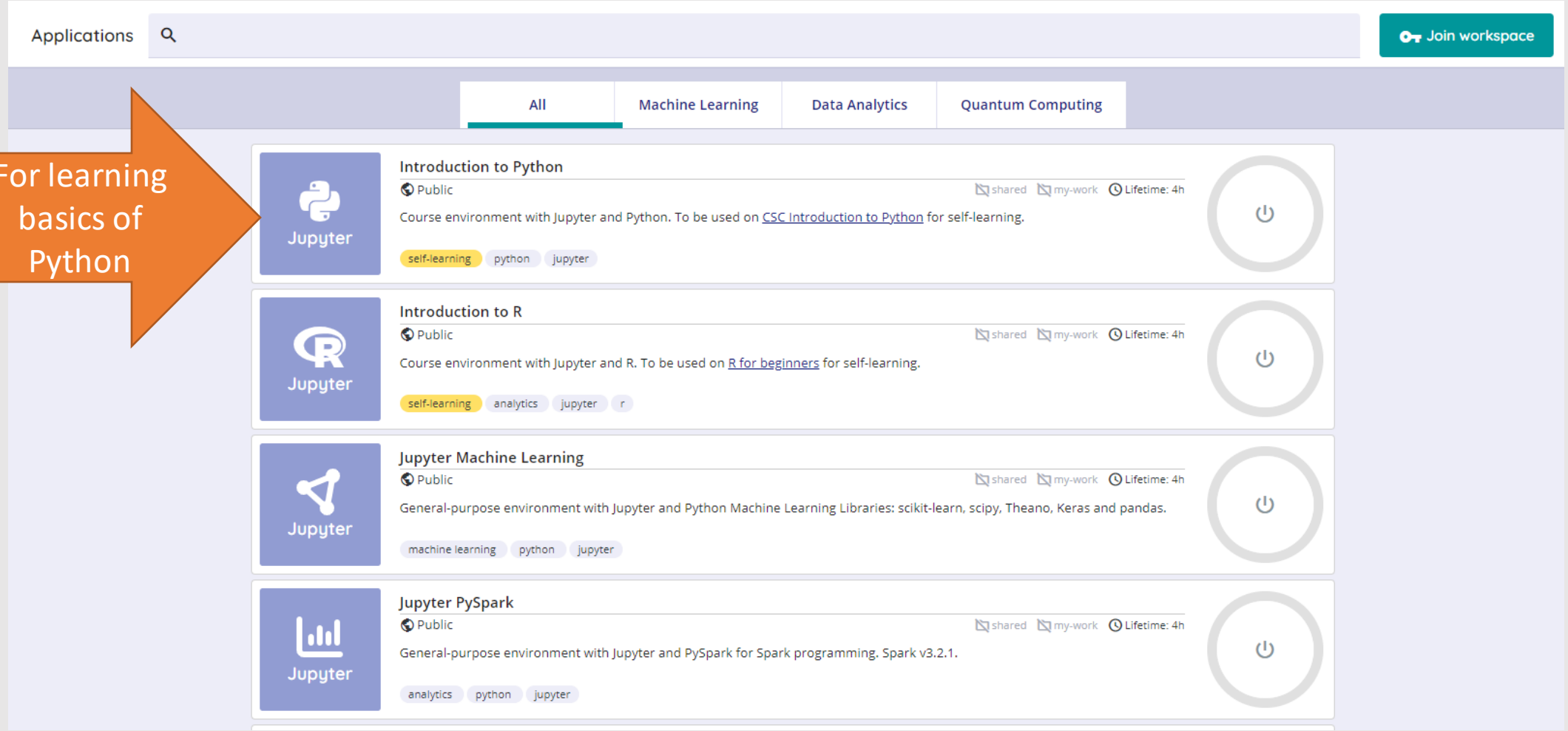
https://colab.research.google.com/

CSC Notebooks (in Finland, EU)



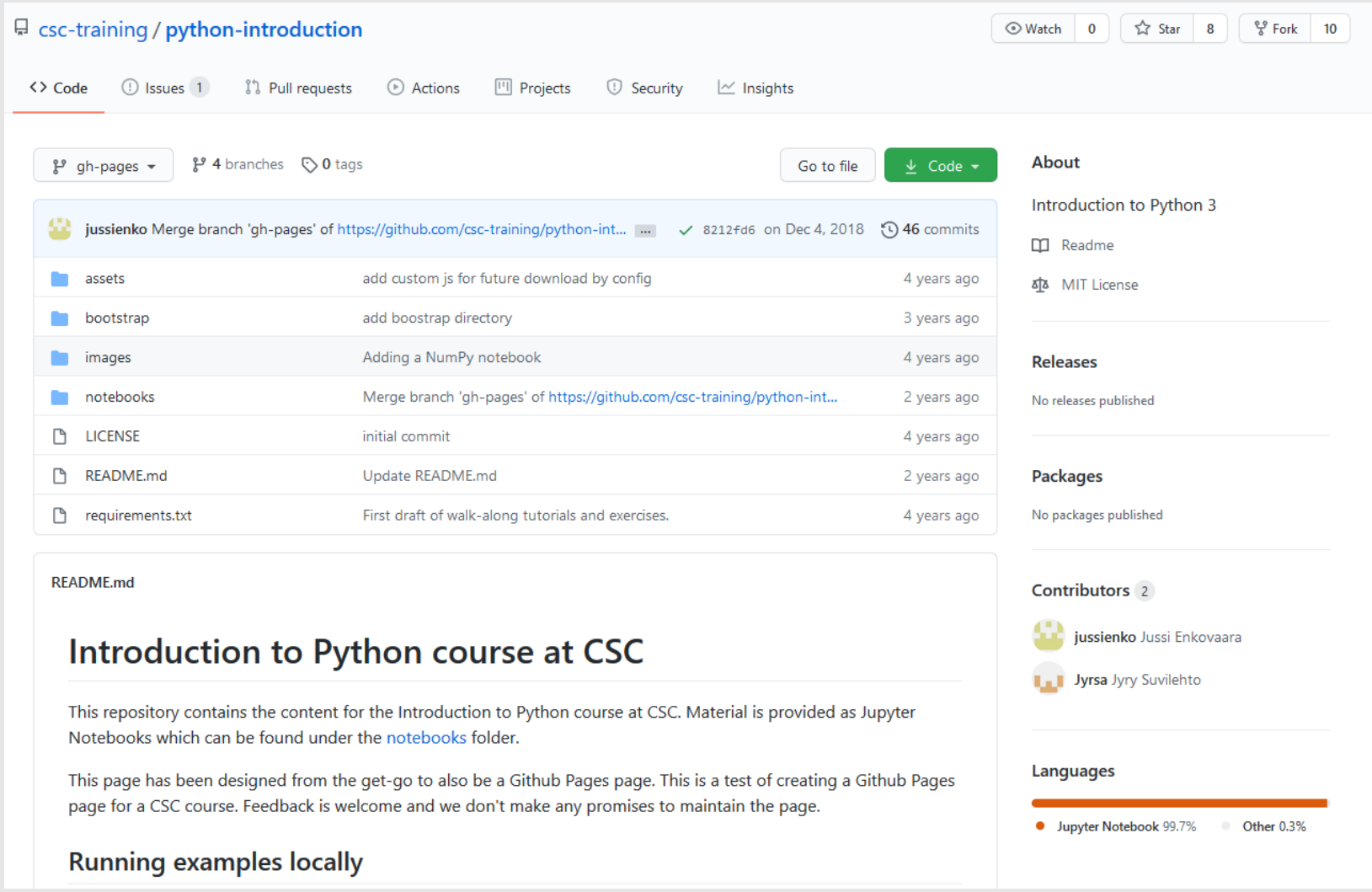
[Notebooks (rahtiapp.fi)]

CSC Notebooks Environments



[Notebooks (rahtiapp.fi)]

Github and Notebooks (Example)



[csc-training/python-introduction: Introduction to Python 3 (github.com)]

Behind the scene

Front End:
- JupyterLab in Browser

Back End:
- your own Laptop as a server, or
- any cloud server like Google Colab, AWS, Azure, CSC Notebooks, …

Figure 1-2. *An overview of the components and layers in the scientific computing environment for Python, from a user's perspective, from top to bottom. Users typically only interact with the top three layers, but the bottom layer constitutes a very important part of the software stack. An example of specific software components from each layer in the stack is shown in the right part of the figure*